Comparison of GSFC v6.22 retrieved products of AIRS vs CrIMSS

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Motivation

- CrIS is expected to continue AIRS climate record
- AIRS and CrIS BT at 900 cm^{-1} for SNO shown only small differences (E.Manning & G. Aumann, 2015)
- AIRS and CrIS agree for uniform scenes at Dome C, differ not more than100 mK at cold BTs (D.Elliott and G.Aumann, 2015)
- CrIS extreme T surf is larger than AIRS extremes (G.Aumann, 2015)
- For climate record we need to compare L2 data.

Climate related limits

Box 1 | Updated energy balance

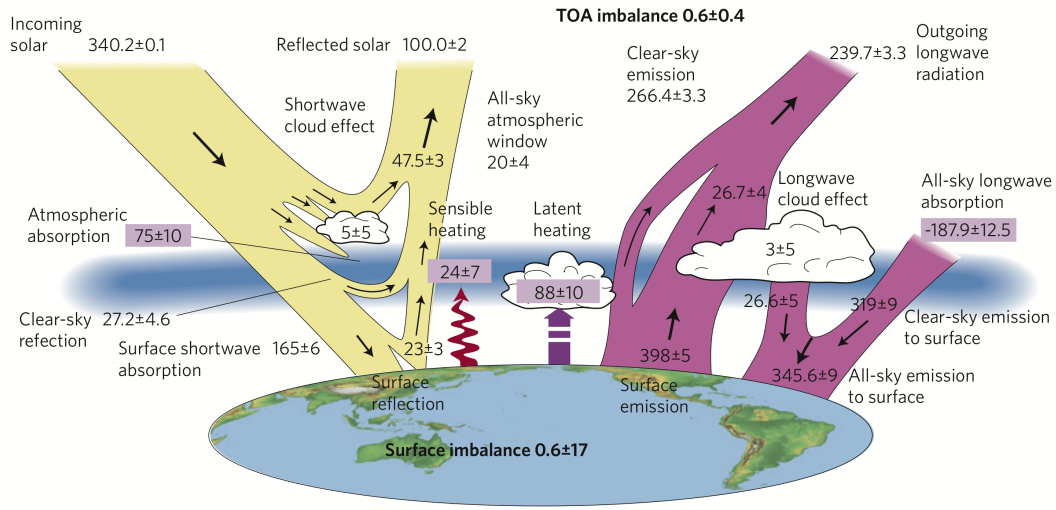
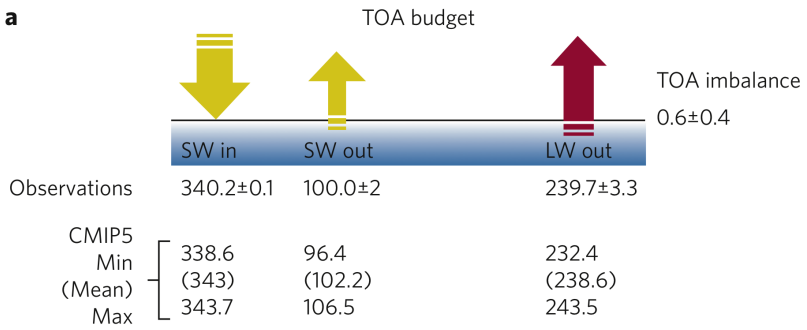
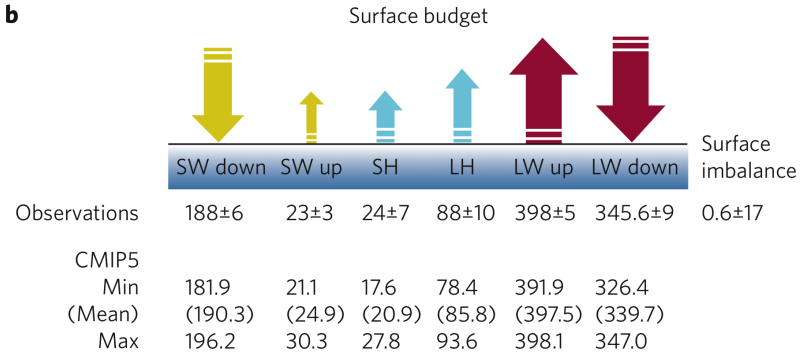


Figure B1 | The global annual mean energy budget of Earth for the approximate period 2000–2010. All fluxes are in Wm^{-2}. Solar fluxes are in yellow and infrared fluxes in pink. The four flux quantities in purple-shaded boxes represent the principal components of the atmospheric energy balance.

Stephens et al., 2012

Climate related limits





A net loss of radiation from Earth by clouds of 21.1±5 Wm^2, mostly by reflection of sunlight from clouds.

Stephens et al., 2012

Climate related limits

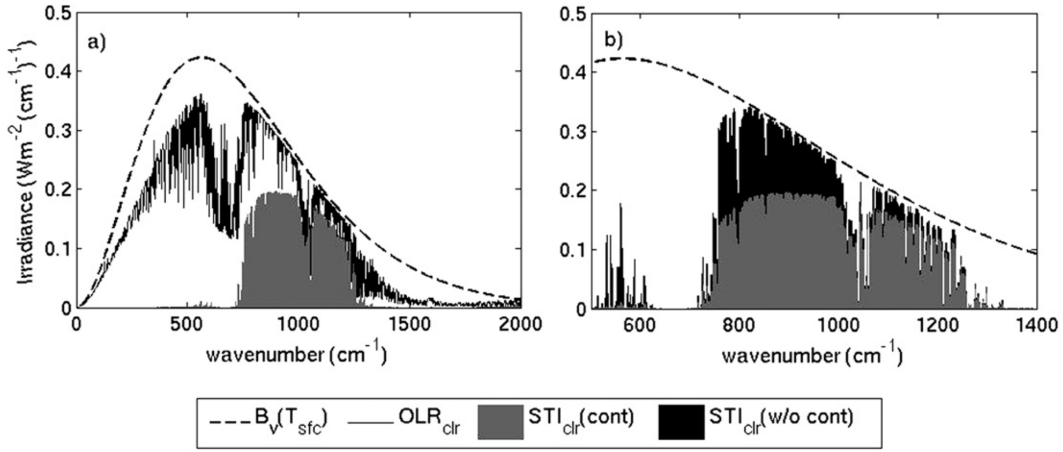


FIG. 1. Spectral distribution of the clear-sky Earth Radiation Budget components [W m^{-2} (cm^{-1})$^{-1}$] using a global-mean atmosphere. (a) Longwave irradiance emitted by surface $B_\nu(T_{sfc})$ assuming it to be a blackbody, the outgoing longwave radiation (OLR_{clr}), and surface transmitted irradiance including the water vapor continuum [STI_{clr} (cont)]. (b) As in (a), over a smaller wavenumber interval, but includes, instead of OLR_{clr}, the surface transmitted irradiance when the water vapor continuum is excluded [STI_{clr}(w/o cont)].

Surface Transmitted Irradiance is 66 W/ m^2 ±20%, with a distinctly different geo- graphic distribution, with a minimum in the tropics and local peaks over subtropical deserts.

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Costa and Shine., 2012

Data and Treat of Data

- We use August 2014 global daily data for matching Aqua and NPP orbits
- The data are retrieved for AIRS and CrIMSS by the same algorithm (GSFC v6.22).
- The data sets are conditioned by QC < 2.
- Both sets were gridded in 1deg x 1deg maps by making a surface in (lat,lon), interpolating the surface at the query points of 1deg x1 deg boxes and returning the data at these points.
- To avoid the data gores we assemble the data for 6 days.

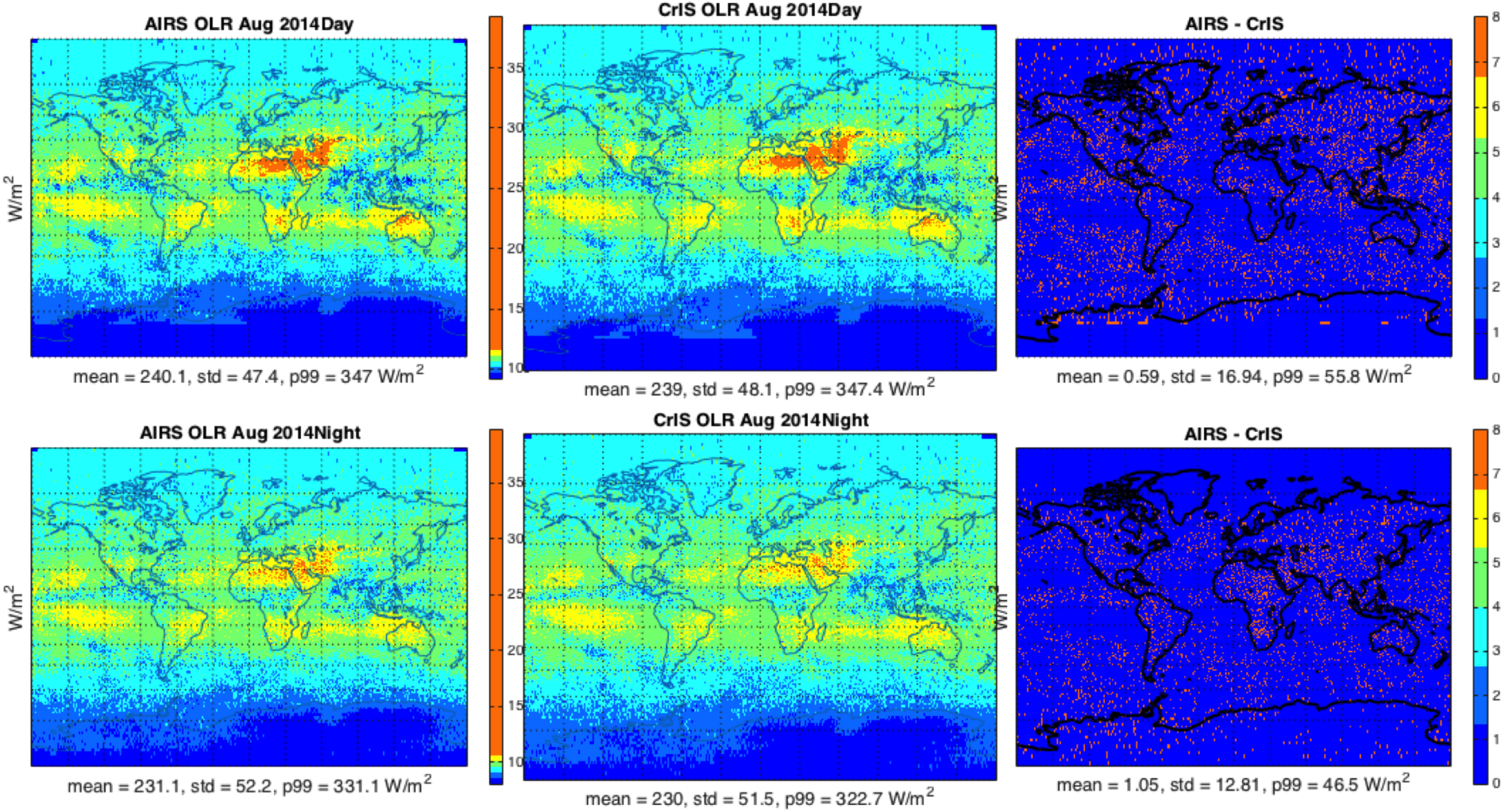
Dates for matching orbits

start	end	mid	duration	lon	lat
2014-08-04 03:13	2014-08-04 16:21	2014-08-04 09:49	13.135	33.112	68.104
2014-08-06 19:17	2014-08-07 08:24	2014-08-07 01:47	13.114	175.93	2.224
2014-08-09 11:17	2014-08-10 00:22	2014-08-09 17:50	13.087	-54.67	-47.507
2014-08-12 03:14	2014-08-12 16:21	2014-08-12 09:49	13.114	-146.479	-67.821
2014-08-14 19:09	2014-08-15 08:14	2014-08-15 01:40	13.083	1.906	23.226
2014-08-17 11:05	2014-08-18 00:12	2014-08-17 17:41	13.111	161.36	77.345
2014-08-20 03:03	2014-08-20 16:07	2014-08-20 09:32	13.08	59.166	6.532
2014-08-22 18:56	2014-08-23 08:02	2014-08-23 01:31	13.098	-166.005	-56.555
2014-08-25 10:53	2014-08-25 23:59	2014-08-25 17:25	13.091	113.556	-42.897
2014-08-28 02:47	2014-08-28 15:52	2014-08-28 09:19	13.079	-109.883	37.476
2014-08-30 18:42	2014-08-31 07:49	2014-08-31 01:17	13.114	154.907	72.287

Evan Fishbein

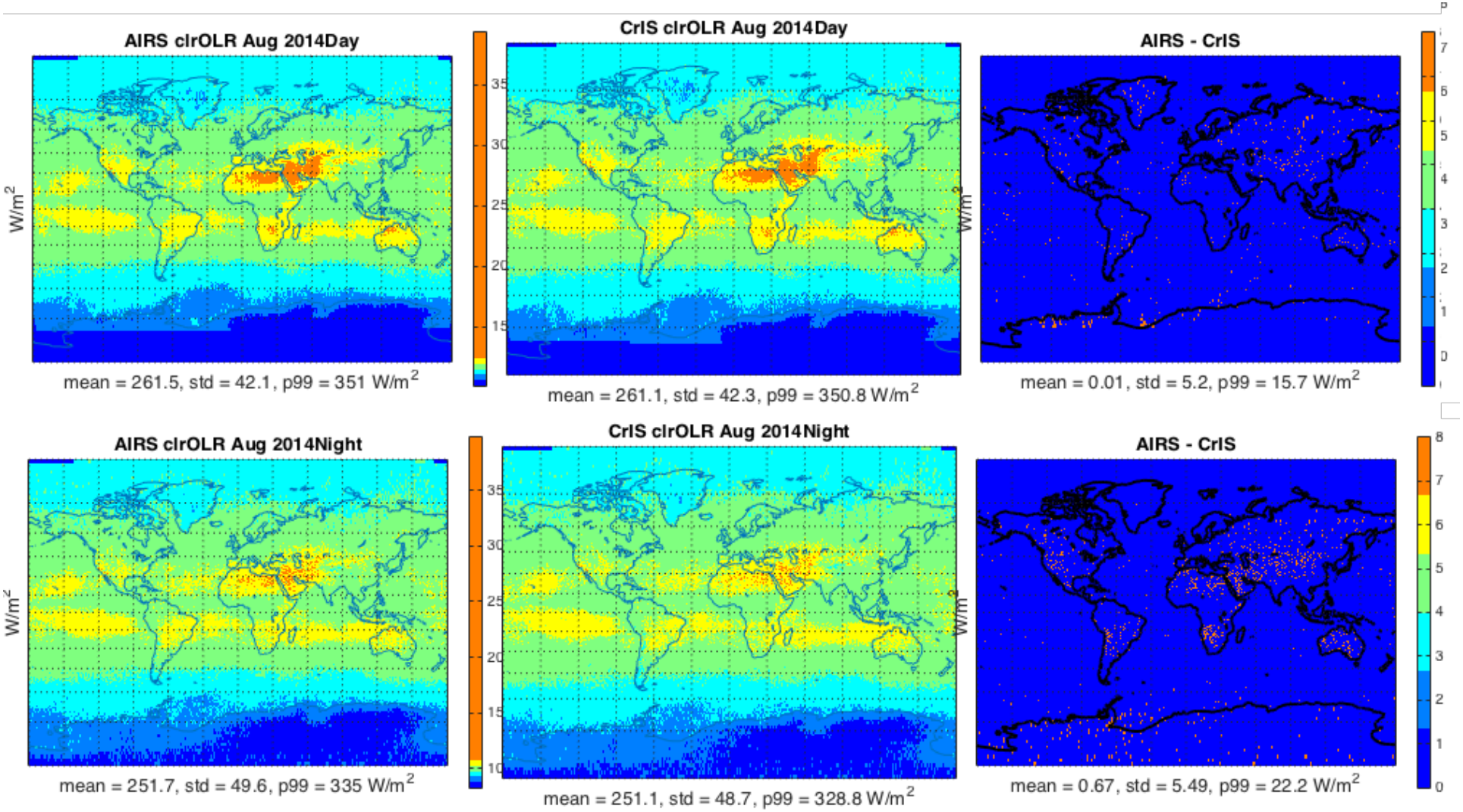
Selected days: 2014-08-04, 12, 20, 25 28,30

OLR A&D data

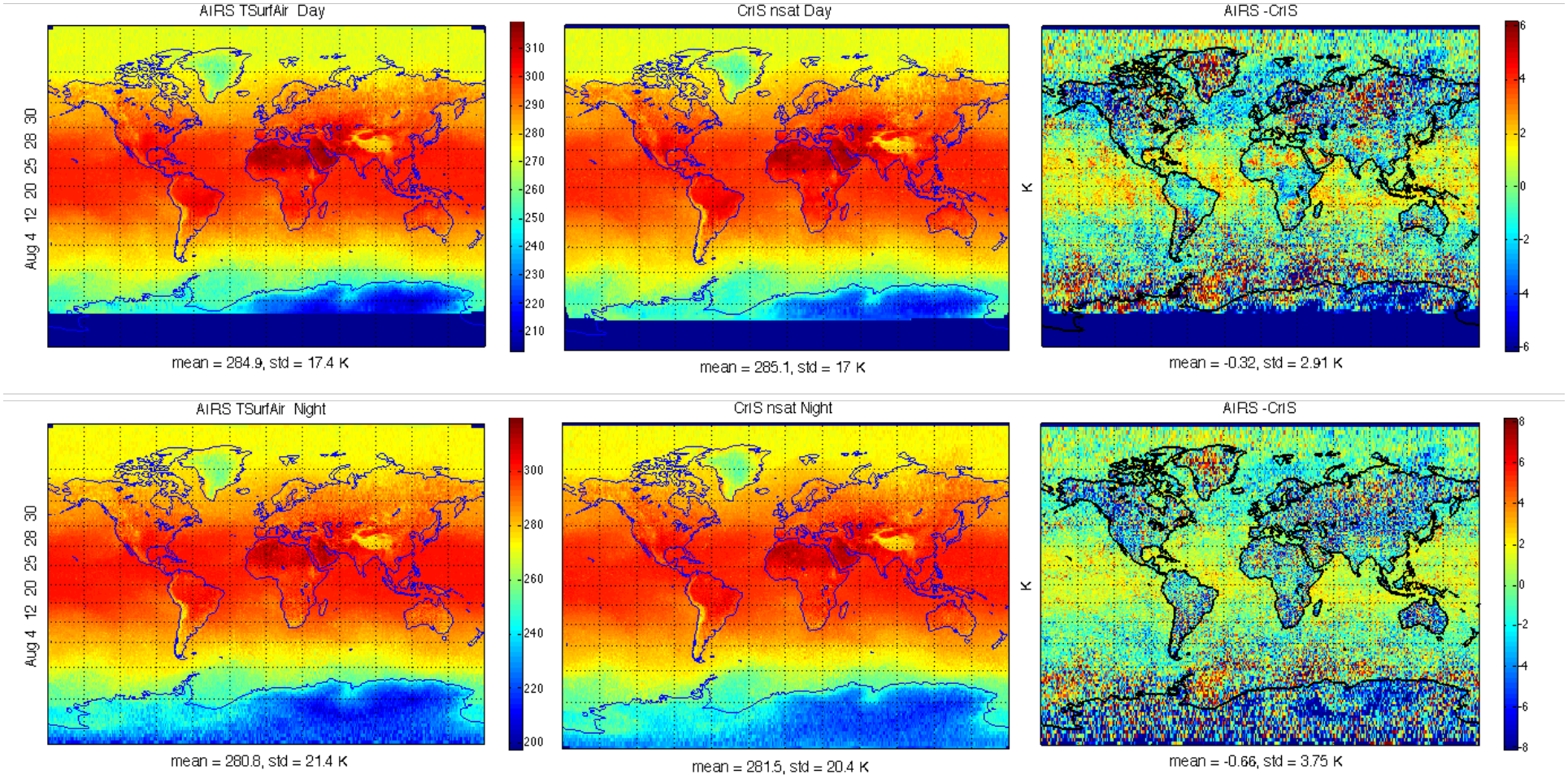


Only grid points exceeding climatological limits are shown in differences

Clear OLR A&D data



Surface Temperature A&D data



Tentative Conclusions

- Globally CrIS L2 match AIRS v6 L2. Global difference does not exceed 1W/m^2 for OLR and 1K for Tsurf.
- Locally CrIS OLR, clrOLR and Tsurf substantially differ from AIRS beyond the climatological uncertainties, in particular over land
- More retrievals are needed to compare the climatic trends